

FURTHER NOTES ON THE RAINFALL OF SINGAPORE.

FIVE years ago I had the privilege of submitting a few notes on the rainfall of Singapore, which appeared in No. 7 of this Journal. I now purpose to add a few more remarks on this interesting study.

In the last notes above referred to, the registers of two places only were taken into account, viz., those of the old criminal Prison between Brass Bassa and Stamford Roads, for the rainfall in Town, and Mr. Knight's on Mount Pleasant, Thompson Road, for the country; but in 1880, on the removal of the Criminal Prison to its new locality, the former was discontinued, and later on Mr. Knight changing his residence the latter also.

It, therefore, became necessary to take a more general view, and a table has been prepared of the Mean Annual Rainfall of Singapore as observed at present at seven stations, which, through the kindness of Dr. ROWELL, Principal Civil Medical Officer, Straits Settlements, in permitting me to have access to the records, I now have the pleasure of submitting, together with charts shewing the ranges of the Mean Annual Rainfall, and Rainy Days since 1869. It will be an easy matter to continue these charts, say at intervals of five years, and thus arrive at some idea of the law of the rainfall of Singapore.

Mr. SKINNER in his article on "Straits Meteorology" (No. 12 of this Journal), is of opinion that it is "not too early to endeavour to obtain some results from the series of Rainfall returns" now to hand, and has ventured to connect certain outbreaks of cholera, *beri-beri*, &c., with the rainfall. The concluding paragraphs of that article are very hopeful and promising. The chart accompanying this paper apparently bears out his anticipations that "an excess of rain may be looked for in the years 1884-85," for the line is an ascending one; but it requires the tracings of a few more years to get a clear knowledge of the rhythm of the alternations of periods of lesser and greater ascents before

the corresponding fallings. For instance, the chart shows a sudden fall in the amount of rain for 1871 and 1872, with a slowly increasing rise up to 1875, followed by a still lower fall in 1877 (the lowest recorded). In 1878 there is almost double the rainfall of 1877, rising still higher in 1879, from which period down to 1883, the annual rainfall was steadily decreasing, but in 1884 it again ascended, and may ascend further if Mr. Skinner's conclusions rest on a sound basis.*

The continuous and steady improvements in the sanitary condition of Singapore town and suburbs within the last eight years have been so marked, that it would hardly be fair to draw conclusive inferences from the old returns of health by comparing them with those of recent dates, and attributing any differences to the rainfall. For instance, when cholera broke out as an epidemic in 1873 (having been in the first instance imported from Bangkok where the disease was raging virulently) Singapore was suffering badly from want of water, the season was unusually dry, nearly all the wells such as they were—many being mere pits a few feet deep without any protective wall—had almost run dry, the brick conduit for bringing the water from the impounding reservoir was a failure, as the water could not rise in the aqueduct over the canal, so that the poorer people resorted to the filthy canal water when the tide had ebbed. The largest number of cases of cholera occurred in the vicinity of that canal *commencing* from the Lunatic Asylum, which suffered severely, *extending* to Kampong Kapur, which was a regular hot-bed for developing, continuing and spreading the disease, and *terminating* at Rochor. There were also some cases of cholera from Kampong Malacca and the crowded parts of the

* It is certainly well to wait until we have a larger series of annual returns before generalising on such a matter too positively; and this branch of the subject is only touched upon now to invite the attention of all who may keep or study our Meteorological Records. But from the evidence already accumulated the long drought of 1882-83, which ended last August, was, I maintain, clearly to be anticipated: for it closed the solar period dating from the limited rainfall (160 inches) in 1872-3, and the subsidiary dry period, showing the fall of 148 inches only, in 1876-7. An excess of rain may, in the same way, be looked for in the years 1884-5, and still more in 1885-6: but not so great an excess, these years merely closing the subsidiary period of excess from 1879-80 (228 inches).—Journal No. 12 of the Straits Branch of the Royal Asiatic Society, pp. 254-5.

town south of the Singapore river, places deficient in water supply, and where sanitation of any sort was never thought of.

Then, again, in 1875-77, outbreaks of cholera in an epidemic form were mainly averted by the untiring exertions of Messrs BAYLISS and COLSON who had charge of the water-works then in course of completion. They opened up the conduit in several places near the Race Course, and stationed a steam engine at the distal end of the aqueduct and pumped the water across the canal, rendering the precious element available to large numbers of people ; and, later on, by the completion of the water-works, good wholesome water was distributed throughout the town, which has helped to produce so marked a change, that since then, cholera or choleraic diarrhœa has not appeared in an epidemic form.

As regards *beri-beri*, I think the Medical returns will show a marked falling off in the numbers treated since the removal of prisoners to the new Jail.

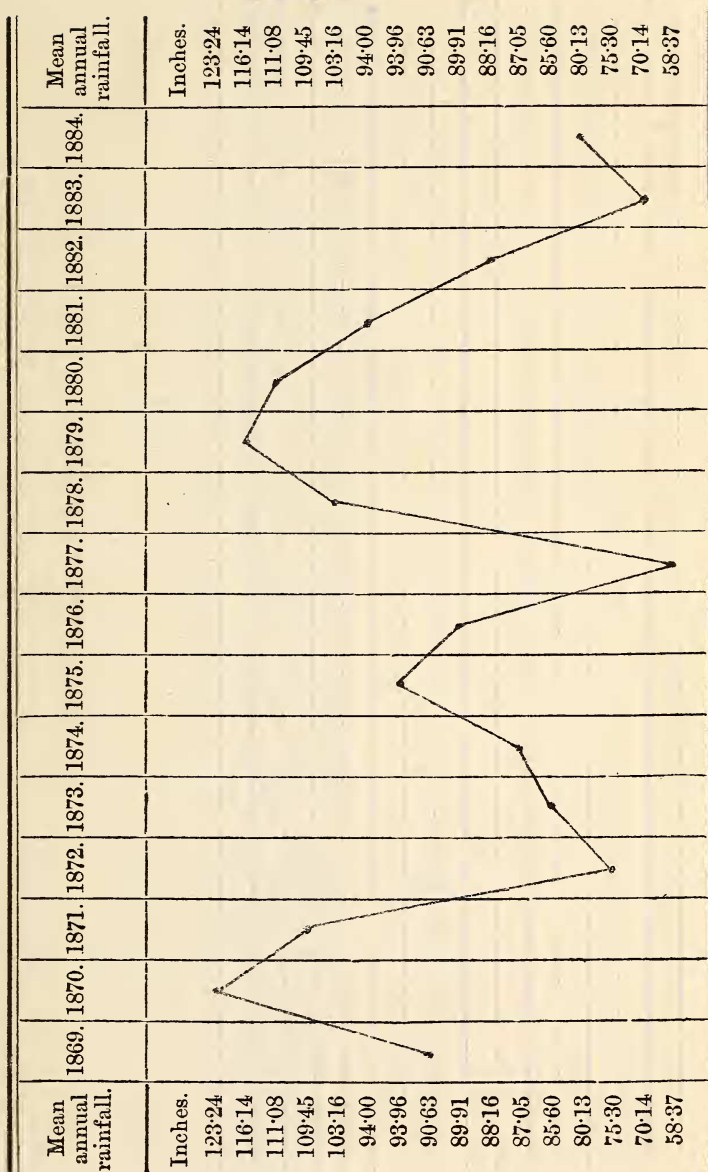
There can be no question that a great many unknown influences are at work on and around this globe of ours which more or less affect the health of its inhabitants. For some time past attention has been drawn to the wonderful spots on the sun, and they have been the subject of study of many observers, but the results must necessarily be slow. That the moon also has a share in some of these influences must be conceded, for it is well known that atmospheric disturbances are more frequent at certain stages of the moon's phases than at others, and quite recently there has been free expression regarding the influences caused or to be caused by the perihelia of certain planets, so that the conclusion is still forced on us, that it is as yet premature to calculate with any certainty on this question ; yet every little effort towards helping its solution should be encouraged, and in time the skein which now seems tangled may be unravelled.

In connection with this line of thought it may be suggested that in this, almost the wealthiest of the British Colonies, it is *not too soon* to provide for an observatory under an Astronomer and Meteorologist. The equatorial position of Singapore gives to the Astronomer a more interesting

field for observations than can be obtained at higher or lower latitudes. But till such an idea is taken up by the powers that be, those who have the means, time and inclination can contribute much information by daily observations of the sun when possible, registering the sun spots, if any, and thus ascertain if there be any connection between their occurrence and our rainfall; and the Principal Civil Medical Officer would also help considerably if he could see his way to having rain gauges and registers kept at Changi or Siranggong (extreme east), Tanjong Karang (west), at the Police stations, Bukit Timah Road 7th mile, and Selitar; a more general average of the rainfall could thus be ascertained. The absence of a station or stations well in the centre of the island is a drawback, the more so as many of the streams running into the impounding reservoir, which supplies the town with its drinking water, are fed by the rains falling on the southern aspect of Bukit Timah. There should be little difficulty in teaching the Police Sergeants in charge of the stations to keep the register.

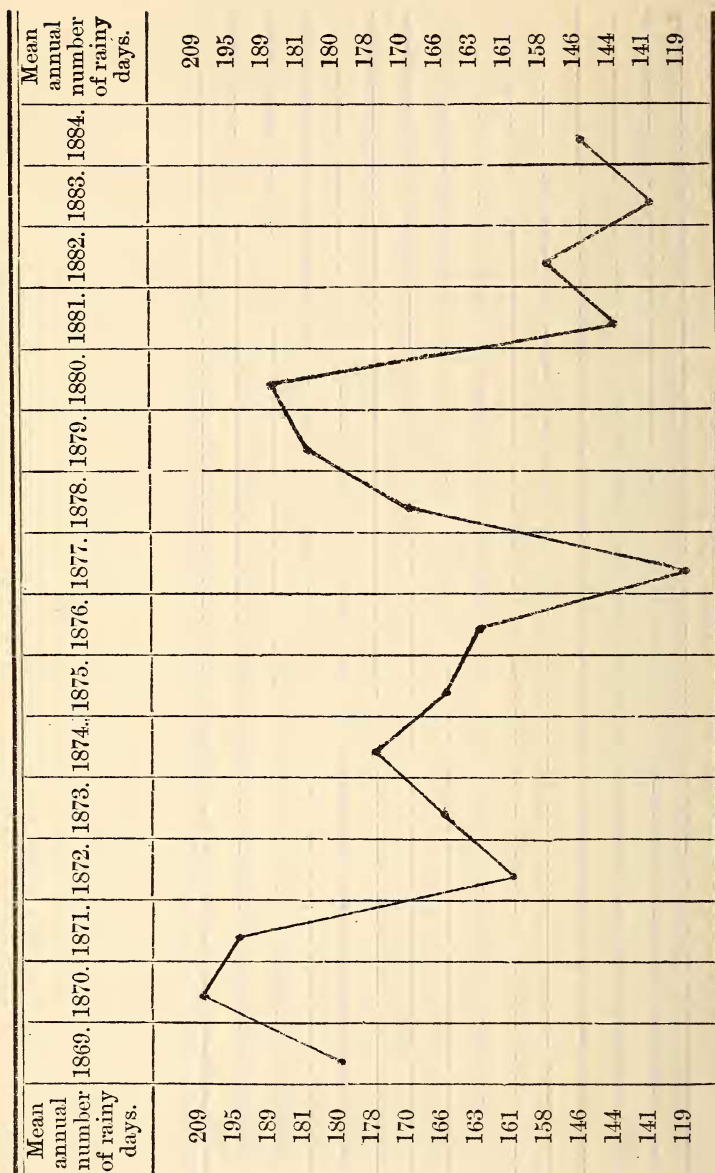
J. J. L. WHEATLEY.

Chart shewing the rise and fall of Rain during the Years 1869 to 1884, Singapore.



SINGAPORE RAINFALL.

Chart shewing the increase and decrease of Rainy days during the Years 1869 to 1884, Singapore.



1884, Singapore.

YEARS.	JANY		DEC.		TOTAL.		YEARS.
	Inches.	Days.	Inches.	Days.	Inches.	Days.	
1869	3·93	21	20·66	26	90·63	180	1869
1870	18·25	25	18·13	18	123·24	209	1870
1871	11·05	17	12·56	16	109·45	195	1871
1872	2·37	22	6·00	15	75·30	161	1872
1873	7·16	20	5·16	17	85·60	166	1873
1874	3·88	20	7·56	17	87·05	178	1874
1875	2·91	18	6·50	15	93·96	166	1875
1876	3·97	19	10·13	21	89·91	163	1876
1877	2·89	11	8·07	17	58·37	119	1877
1878	13·57	16	9·91	20	103·16	170	1878
1879	19·18	15	10·15	18	116·14	181	1879
1880	5·17	21	8·56	16	111·08	189	1880
1881	13·35	16	13·32	16	94·00	144	1881
1882	6·58	15	7·21	15	88·16	158	1882
1883	3·18	18	7·76	19	70·14	141	1883
1884	8·81	12	12·00	11	80·13	146	1884
Means	7·89	18	10·23	17	92·27	167	Means